

ECHOCARDIOGRAPHIC FINDINGS OF DILATED RIGHT CORONARY ARTERY*

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A dilated right coronary artery may be encountered in cases of right coronary artery fistula, of aberrant left coronary artery arising from the pulmonary artery, and of supraaortic stenosis¹⁻³. M-mode echocardiographic findings of dilated right coronary artery in cases of aberrant left coronary artery arising from the pulmonary artery were first reported by Yoshikawa et al². Matsuo and co-workers³ have observed, in ultrasonography, similar features originating in the dilated right coronary artery in a case of coronary artery fistula. Echocardiographically, we recorded a dilated right coronary artery in one patient with supraaortic stenosis and in three patients with coronary artery fistula. Since the detection of the dilatation of the right coronary artery by echocardiography is helpful in the diagnosis of the above conditions we considered our cases to be worth presenting.

Case Reports

Case 1

An 11-year-old girl was referred to the Cardiology Unit for cardiac evaluation. Physical examination revealed no cyanosis. There was a grade III/IV systolic murmur along the left sternal border. A continuous murmur was heard over the aortic area. ECG showed left ventricular hypertrophy. An X-ray examination of the chest revealed increased pulmonary vascularity, a prominent pulmonary artery segment and left ventricular dilatation.

Cardiac catheterization and angiocardiography were performed. Aortograms revealed a right coronary artery fistula draining into the right atrium. The right coronary artery was dilated.

Echocardiography showed a dilated left ventricle and paradoxical ventricular septal motion. An abnormal structure anterior to the aortic root was recorded. This image suggested a lumen, anterior to the aorta (Figure 1).

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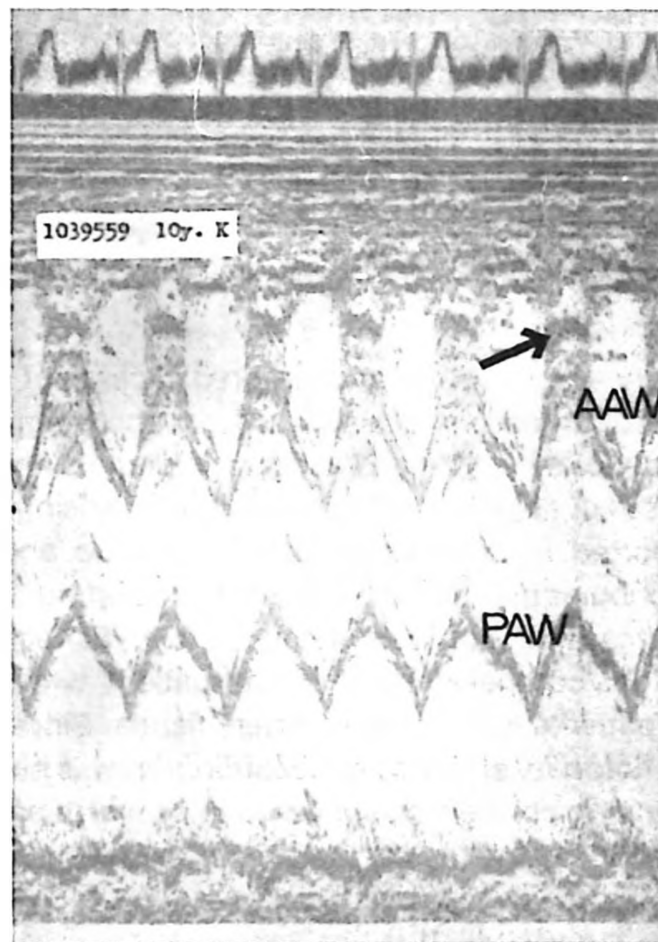


Figure 1

**M-mode aortic echocardiogram of a case with coronary artery fistula (Case 1).
Arrow indicates an abnormal structure anterior to the aortic root.**

**PAW - Posterior aortic wall
AAW - Anterior aortic wall**

The right coronary artery fistula was treated surgically. Upon operation the right coronary artery was found to be 1 cm in diameter.

In the postoperative period, repeated aortograms revealed no fistular connection, and in the echocardiography there was no abnormal structure anterior to the aortic root, as there had been preoperatively (Figure 2).

Case 2

A four-year-old boy was admitted to the hospital for cardiac evaluation. There was no cyanosis or respiratory distress. Peripheral pulses were bounding.

A systolic thrill was felt over the mid-precordium. A continuous murmur was heard at the left third intercostal space. On the ECG, the QRS axis in the frontal plane

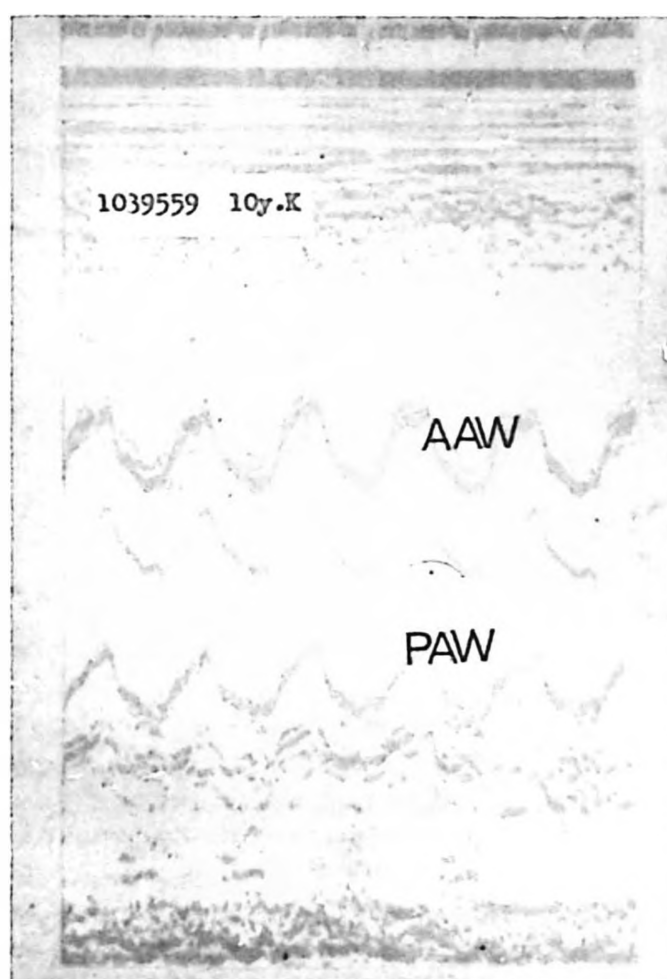


Figure 2

Postoperative aortic echocardiogram of the first case. The abnormal structure anterior to the aortic wall is no longer present.

**PAW - Posterior aortic wall
AAW - Anterior aortic wall**

was + 120°. There was right ventricular conduction delay. Radiological examination of the chest showed right ventricular dilatation. Pulmonary vascularity was increased. In cardiac catheterization there was a step up of oxygen saturation in the right atrial level. Selective angiocardiography revealed a dilated right coronary artery and a coronary artery fistula draining into the right atrium.

Echocardiography showed a dilated left ventricle. An abnormal structure anterior to the aortic root and suggesting a lumen, was also recorded (Figure 3).

Following surgical treatment of the lesion, an echocardiography showed that the abnormal structure anterior to the aortic root, had disappeared.

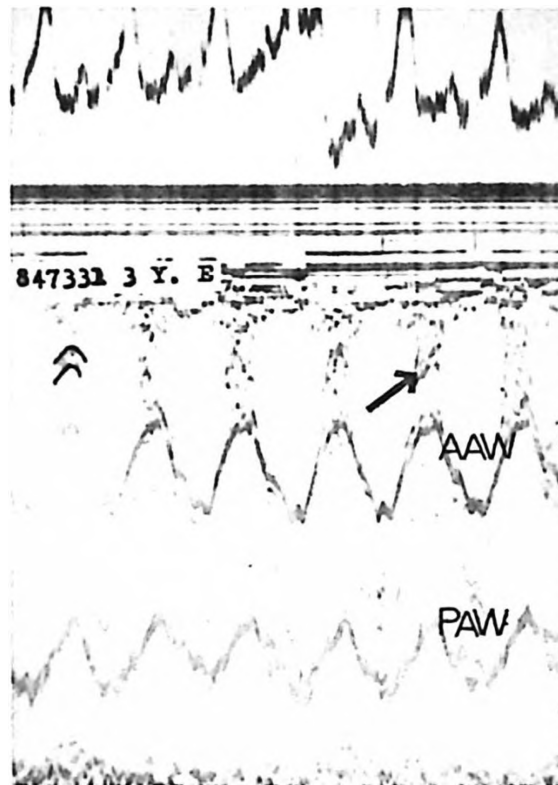


Figure 3

**M-mode aortic echocardiogram of a case of coronary artery fistula (Case 2).
Arrow indicates an abnormal structure anterior to the aortic root.**

**PAW - Posterior aortic wall
AAW - Anterior aortic wall**

Case 3

A six-year-old girl was referred to the hospital suspected of having patent ductus arteriosus. On physical examination a continuous murmur was heard at the second left intercostal space. ECG showed left ventricular hypertrophy. Telecardiograms revealed cardiac enlargement.

Cardiac catheterization showed an 8% increase in oxygen saturation at the right ventricular level. Cine-angiocardiograms revealed a right coronary artery fistula draining into the right ventricle.

Echocardiography recorded a lumen-shaped abnormal structure, projecting into the anterior parts of the right ventricle (Figure 4).

Case 4

An acyanotic 8-year-old boy had a grade III/VI systolic ejection murmur over the upper part of the sternum. ECG showed left ventricular hypertrophy. Telecardiograms revealed left atrial and left ventricular enlargement.

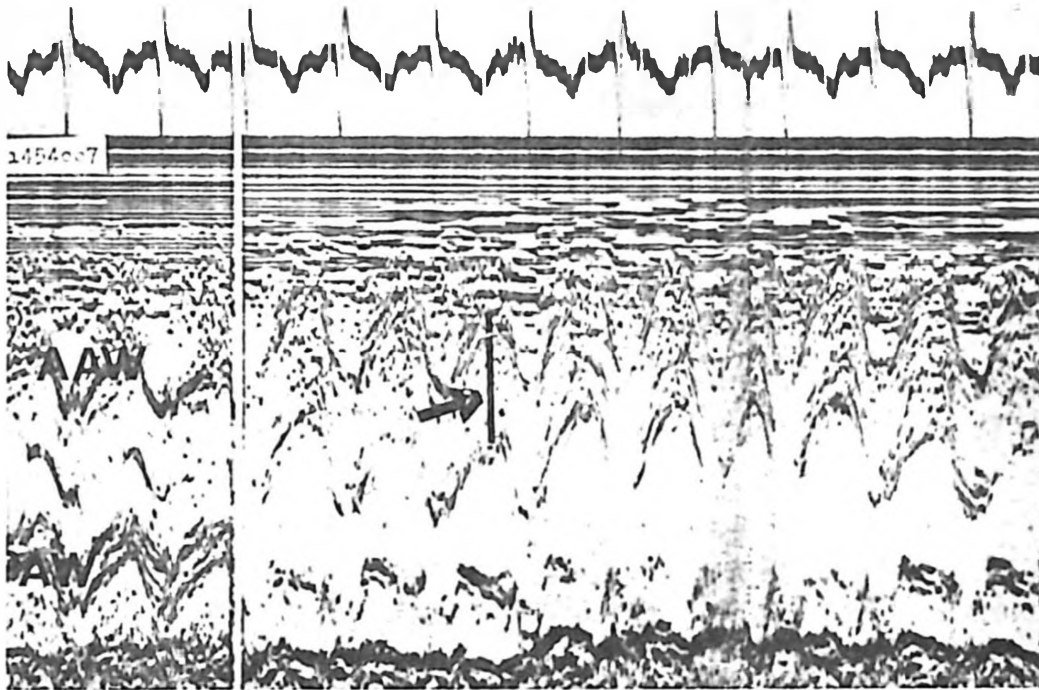


Figure 4

M-mode echocardiogram of the third case. The arrow points to a lumen-shaped abnormal structure projecting into the anterior parts of the right ventricle.

This image originates from right coronary artery-right ventricle fistula.

PAW - Posterior aortic wall

AAW - Anterior aortic wall

Echocardiography revealed an abnormal structure anterior to the aortic root (Figure 5).

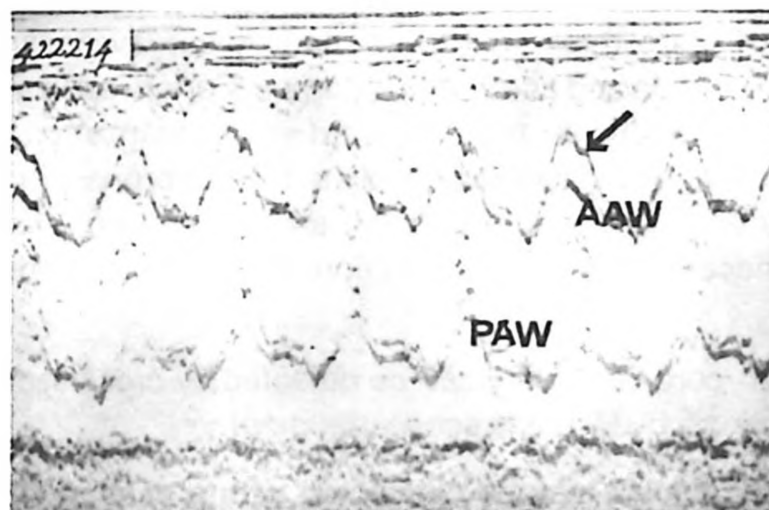


Figure 5

M-mode echocardiogram of the case of supraaortic stenosis with dilated right coronary artery (Case 4). The arrow indicates abnormal structure anterior to the aortic root.

PAW - Posterior aortic wall

AAW - Anterior aortic wall

Cine-angiocardiograms showed a dilated right coronary artery and diffuse narrowing of the aortic root above the semilunar valves. In this area a systolic pressure gradient of 145 mmHg was recorded.

Surgical treatment was attempted, but it was not successful because of the diffuse narrowing.

Discussion

M-mode echocardiographic findings of a dilated right coronary artery in a case of aberrant left coronary artery arising from the pulmonary artery have been described by Yoshikawa et al as a structure anterior to the aortic root and arch-like in appearance, convex toward the chest wall in maximum systole. During systole the structure moves away from the aortic root whereas it moves toward the aortic root in mid-diastole.

Similar echo findings were observed in our patients with a dilated right coronary artery. Three of the four cases presented here had coronary artery fistula, the fourth had supraaortic stenosis. The echo findings we observed and those reported in the literature^{2,3}, were considered to originate from a dilated right coronary artery. Absence of such echo findings after surgical correction of the aberrant right coronary artery confirms this opinion.

In our case of a dilated right coronary artery in conjunction with supraaortic stenosis (Case 4), the mechanism of dilatation is related to an elevated aortic pressure in the area where the coronary arteries originate. To our knowledge, this is the first such case in medical literature to have been evaluated echocardiographically.

Clinical diagnosis of these three conditions, namely supraaortic stenosis, right coronary artery fistula and aberrant left coronary artery arising from the pulmonary artery, is extremely difficult. Although cardiac catheterization and angiography are possible diagnostic methods; a dilated right coronary artery can be more easily detected by echocardiography. When an enlarged right coronary artery is shown during echocardiographic examination these three conditions should be considered.

Dilatation of the left coronary artery can be detected by cross-sectional technique, but that of the right only by M-mode echocardiography².

The coronary artery fistulas may be connected with a cardiac chamber or with a large channel such as a coronary sinus. In the coronary-cardiac fistula, the coronary artery is usually enlarged as it was in our cases. Whereas, in the coronary arteriovenous fistula, it is mildly dilated². For this reason, when echocardiography reveals an enlarged right coronary artery in a case giving a clinical impression of coronary artery fistula, coronary-cardiac fistula should also be considered.

Summary

Four cases, each presenting a dilated right coronary artery, detected by means of echocardiography, are reviewed. Of these, one is a case of supraaortic stenosis, the other three of coronary artery fistula. Since the detection of dilation of the right coronary artery may be useful in the diagnosis of right coronary fistula, supraaortic stenosis and aberrant left coronary artery arising from the pulmonary artery, it seemed worthwhile to report these four cases and to review the relevant literature.

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